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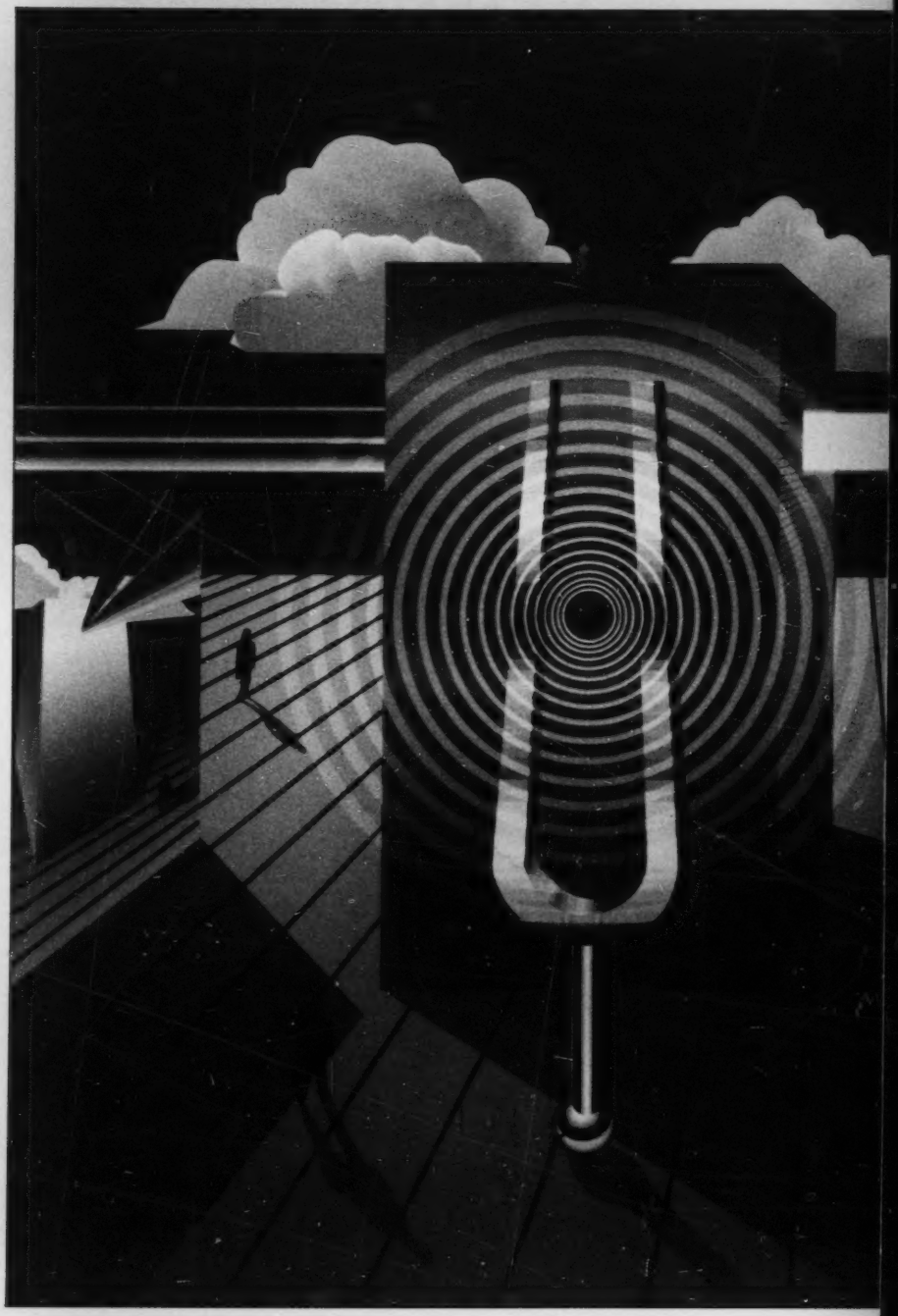
FINE-TUNING MAINFRAMES IN THE HIGH-MIPS ERA



COMPLETE BUYERS' GUIDE: 286/386 MICROS

HOW THE FEDS DRAG DOWN ENCRYPTION

DATA DICTIONARIES—STATE OF THE ART

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FOLLOWING THE LEADERS

Workstation leaders feel the heat

by Lee Keough

Technical workstation vendors, the high fliers of the computer industry for the past two years, are following a pattern familiar to their counterparts in the microcomputer market. As prices have fallen and functionality expanded, the market for new applications has exploded.

In the scramble to capitalize on new market opportunities, workstations from hardware heavyweights Digital Equipment Corp. and IBM have not been able to seriously challenge entries from market leaders Sun Microsystems Inc. (Mountain View, CA) and Apollo Computer Inc. (Chelmsford, MA). In an attempt to change that trend, last month DEC slashed the prices of its workstations by up to 48 percent, and it's now offering its VAXstation 2000 for $4,600. DEC officials say its new pricing structure will broaden the workstation market.

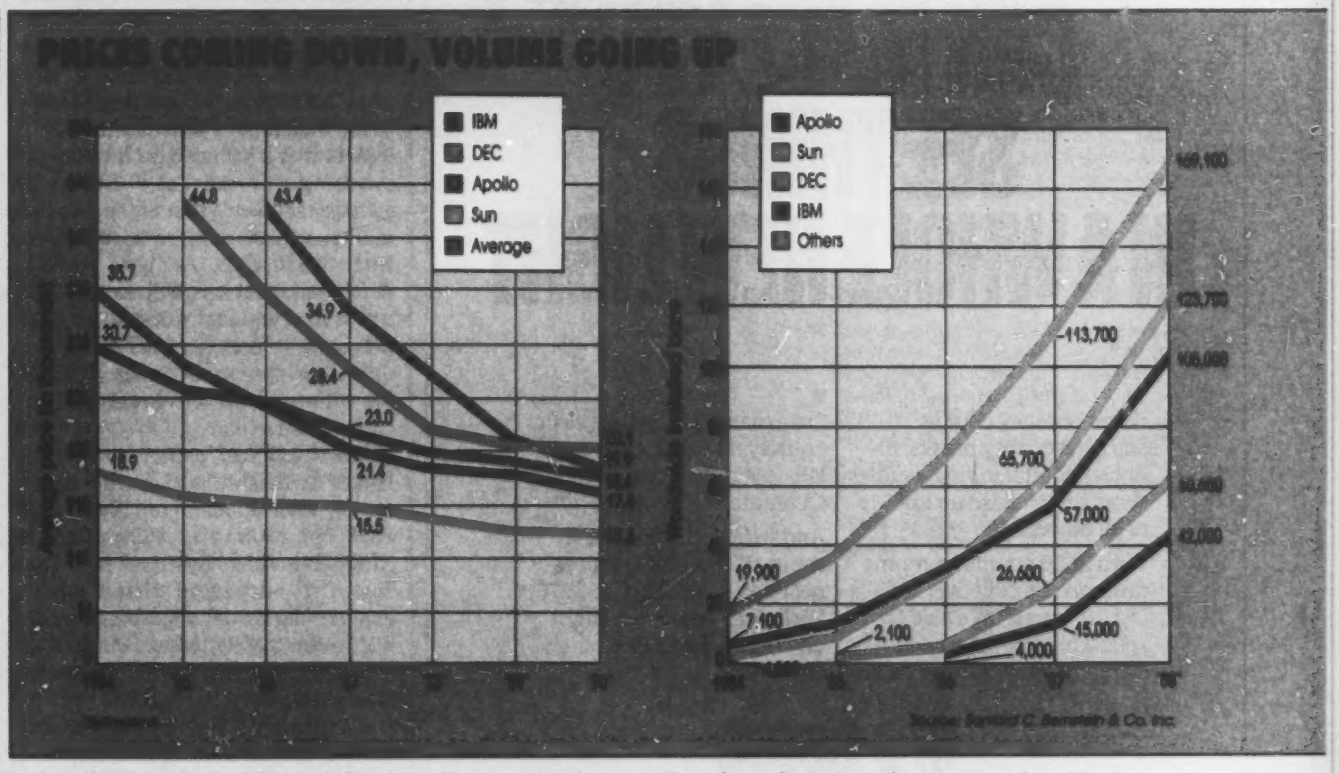
Apollo and Sun also face competition from market newcomers. At the low end, a number of Japanese and American vendors are rushing to provide low-cost versions of workstations offered by Sun and Apollo. At the high end, more vendors—including Sun and Apollo—are lining up challenges to superworkstation leader Silicon Graphics (Mountain View, CA).

"Superworkstations are a hot idea right now," says John P. Rohal, an analyst with Alex. Brown & Sons, a Baltimore-based stock brokerage. Priced at $60,000 to $100,000 each, these workstations deliver to the desktop the processing and graphics power needed for simulation, three-dimensional modeling, and animation.

Silicon Graphics, with sales of $80 million last year, markets workstations based on a reduced instruction set computing (RISC) architecture. Silicon Graphics offers the best blend of graphics and power, says Rohal, but other vendors are coming up fast. Hewlett-Packard Co. and Apollo, for example, have targeted superworkstations as a high-growth market.

In May, Hewlett-Packard announced the HP 9000 Model 825 SRX workstation, part of its Spectrum line of RISC-based technical computers. At 8.2 million instructions per second (MIPS), the 825 SRX offers the highest performance rating of any workstation on the market. Apollo claims its DN590 Turbo

Denise Bartlett



Price reductions and additional functionality are greatly expanding the technical workstation market. Market leaders Sun and Apollo are continuing their market dominance by pricing their machines aggressively.

workstation offers the best price/performance ratio in the superworkstation market. Analysts add that some well-financed startups are expected to introduce competitive offerings by the end of this year.

Rosalie Buonauro, director of marketing for Silicon Graphics, says that Silicon's RISC-based architecture is a key advantage in the superworkstation market. Only Hewlett-Packard is positioned to compete, she says, adding that Apollo and Sun will have to find ways to overcome the performance limits of the Motorola 68020 chip to equal the power potential of a RISC machine.

Buonauro says that while its competitors are seeking growth through their own installed bases, Silicon Graphics is still focused on providing new applications that do not overlap with those of the mainstream vendors.

Sun Microsystems is investing from $10 million to $12 million to bring out a superworkstation this year. John Hime, Sun's vice president of product marketing, will not discuss the development project. But, he says, no other workstations on the market, including those offered by Silicon Graphics, can be classified as superworkstations. "Nothing comes close," he contends. "When and if we come out with a superworkstation, it will be significantly more powerful than anything on the market now."

Sun's trademark is aggressive pricing. If Sun enters the high end of the market, it will probably pose a stiff price challenge to Silicon Graphics and its competitors.

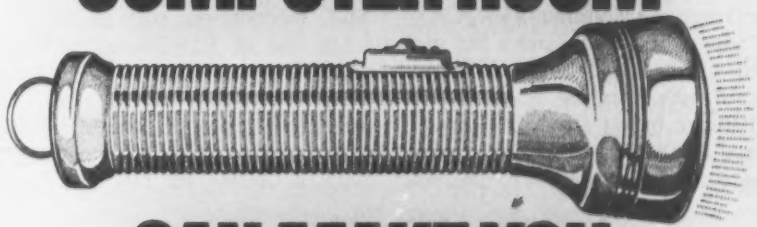
While Sun appears to be aiming high at superworkstations, it is also planning a foray into the microcomputer market, analysts say. They point to Sun's April price reduction, to less than $5,000, of its diskless workstation, which runs at 1.5 MIPS and offers 1 Mbyte of memory. "Sun's desk-top machine may not be expensive, but Sun has recognized it can make most of its money on peripherals and software," says Robert Herwick, an analyst with San Francisco stock brokerage Hambrecht & Quist.

Mark Stahlman, an analyst with Sanford C. Bernstein & Co. Inc., says that Sun's price cut is deceiving. It merely reflects the price of the diskless workstation after it was discounted—which it often was. "Sun dropped the price to get the attention of software developers and personal computer retailers," says Stahlman. "I look at it as a calling card into the microcomputer market." Stahlman guesses that Sun's first entry into that market will be a micro based on the Intel 80386 chip. Analysts say that 386-based machines will not be a factor in the technical workstation market until a version of AT&T's Unix operating system becomes available for them. Sun, obviously, could change that.

Sun itself can expect some challenges at the low end from vendors selling micros based on 32-bit Intel 80386 or Motorola 68020 chips. In May, Televideo Systems Inc. (San Jose, CA) introduced what it calls an engineering workstation based on the 80386 for $3,995. More vendors are expected to follow with 386-based workstations.

Competition from Japan is expected to increase, although its impact is uncertain. Last month, NEC Information Systems introduced the first

A POOR COMPUTER ROOM



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Sun "clone," a 32-bit technical workstation based on the Motorola 68020 chip. "The Japanese have every intention of producing Sun clones, using the Motorola chip and probably Ethernet," says Herwick. Sun's John Hime, noting that NEC's workstation can't run Sun software, disputes its description as a clone. He also doubts NEC poses a threat to Sun, a prognosis with which Herwick agrees. "Those clones will be mere hot boxes, without software development tools," Herwick notes. "That's why I don't think the Japanese are a significant threat to Sun." Both Herwick and Sun officials agree, however, that Japanese vendors could become a factor in the market if they offer users lower prices, a likely scenario.

If Japanese vendors aren't serious threats to Sun in low-cost workstations, some of the old-line minicomputer computer-aided design and manufacturing vendors might be. These vendors have suffered at the hands of workstation vendors offering users better price/performance ratios. Intergraph Corp., Huntsville, AL, for example, has regrouped and plans to retake some business from Sun and Apollo with its Interpro 32C and Interact 32C workstations. Intergraph's workstations are based on Fairchild Semiconductor's "Clipper" microprocessor; they run Intergraph applications software under Unix. Intergraph is selling its workstations through value-added resellers. Due to a scarcity of Clipper chips, Intergraph has had trouble meeting its initial orders, but the vendor claims that the problem is being resolved.

While Sun pursues an aggressive pricing strategy, Apollo has indicated it will not play the same game, according to Herwick. "Apollo emphasizes support, graphics capability, and third-party applications," he says. "In all three areas, it is superior to Sun."

Analysts say both Apollo and Sun have a good shot at becoming broad-based systems suppliers. That should be good news for users with big commitments to the vendors' respective standards efforts in components, software, and communications protocols. Both also have have sophisticated networking schemes that give users access to information stored across incompatible systems.

"Falling prices are driving the market, but networking is driving the differentiation between vendors," says John Rohal. Sun, with its Network Filing System, has led the effort to provide networking tools that allow users to share files across incompatible systems. Not to be outdone, Apollo this past spring began pushing its Network Computing System as a standard for sharing applications between dissimilar machines.

Stahlman believes Sun and Apollo will continue to maintain their leads in the workstation market over larger vendors like IBM, Digital Equipment Corp., and Hewlett-Packard. Although International Data Corp. pegs Hewlett-Packard as the future workstation leader, with Sun and Apollo close behind, other analysts contend that Hewlett-Packard sells its workstations as adjuncts to its instrument business and is thus not in direct competition.

"The workstation market is moving into the 'established' phase," notes Stahlman. "Soon it will be nearly impossible to catch Apollo or Sun." ■

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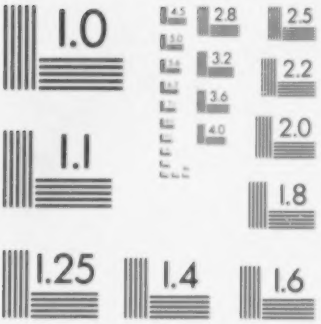

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